

Applicant : David L. Poll, et al.  
Appln. No. : 10/713,792  
Page : 2

**Amendments to the SPECIFICATION:**

Please replace paragraph [0054] with the following amended paragraph:

[0054] First and second transparent elements 28 and 30 may be any material which is transparent and has sufficient strength to be able to operate in the environmental conditions to which the device will be exposed. Elements 28 and 30 may comprise any type of borosilicate glass, soda lime glass, float glass, or any other material, such as, for example, MYLAR®, polyvinylidene chloride, polyvinylidene halides, such as polyvinylidene fluoride, a polymer or plastic, such as cyclic olefin copolymers like Topas® available from Ticona, LLC of ~~Summitt~~ Summit, New Jersey, that is transparent in the visible region of the electromagnetic spectrum. Elements 28 and 30 are preferably made from sheets of glass.

Please replace paragraph [0056] with the following amended paragraph:

[0056] Transparent electrodes 32 and 34 may be made of any material which bonds well to transparent elements 28 and 30, is resistant to corrosion to any materials within the electrochromic device, resistant to corrosion by the atmosphere, has minimal diffuse or specular reflectance, high light transmission, near neutral coloration, and good electrical conductance. Transparent electrodes 32 and 34 may be fluorine-doped tin oxide, doped zinc oxide, zinc-doped indium oxide, tin-doped indium oxide (ITO), ITO/metal/ITO (IMI) as disclosed in "Transparent Conductive Multilayer-Systems for FPD Applications," by J. Stollenwerk, B. Ocker, K.H. Kretschmer of LEYBOLD AG, Alzenau, Germany, the materials described in above-referenced U.S. Patent No. 5,202,787, such as TEC 20 or TEC 15, available from ~~Libbey Owens Ford Co.~~ Libbey-Owens-Ford Co. of Toledo, Ohio, or other transparent conductors. Generally, the conductance of transparent electrodes 32 and 34 will depend on their thickness and composition.

Applicant : David L. Poll, et al.  
Appln. No. : 10/713,792  
Page : 3

IMI generally has superior conductivity compared with the other materials. IMI, however, is known to undergo more rapid environmental degradation and suffer from interlayer delamination. The thickness of the various layers in the IMI structure may vary, but generally the thickness of the first ITO layer ranges from about 10 Å to about 200 Å, the metal ranges from about 10 Å to about 200 Å, and the second layer of ITO ranges from about 10 Å to about 200 Å. If desired, an optional layer or layers of a color suppression material may be deposited between transparent electrodes 32 and 34 and the inner surface of element 28 to suppress the transmission of any unwanted portions of the electromagnetic spectrum.

Please replace paragraph [0073] with the following amended paragraph:

[0073] Fig. 4A shows an electrochromic window assembly 140 constructed in accordance with a fourth embodiment of the present invention. The embodiment shown in Fig. 4A differs from the prior embodiments in that one or more additional ~~electrooptic~~ electro-optic device(s) 142 is/are provided within the airtight chamber defined between substrates 12 and 14. First electrochromic device 22 is preferably positioned as close as possible or on the inward-facing surface 12b of first substrate 12 while second electro-optic device 142, which may be another electrochromic device, or a polymer dispersed liquid crystal or suspended particle device (SPD), is positioned closer to the second substrate 14. If devices 22 and 142 are to be formed on the respective surfaces 12b and 14a of substrates 12 and 14, then the construction of Figs. 3A and 3B may be utilized in tandem for the construction shown in Figs. 4A and 4B. On the other hand, if one or more of the devices 22, 142 are spaced apart slightly from the respective substrates 12 and 14 so as to define respective chambers 144 and 148, gasses having a high thermal conductivity may be contained within chambers 144 and 148 so as to facilitate the transfer of heat from the

Applicant : David L. Poll, et al.  
Appln. No. : 10/713,792  
Page : 4

electrochromic devices to the outside of the inner window chamber 146. Chamber 146 would then preferably be filled with an inert insulating gas such as argon. Chamber 146 may also be filled with an inert solvent or a free-standing gel.

Please replace paragraph [0083] with the following amended paragraph:

[0083] As shown in Fig. 6C, coated substrate 210 preferably includes a fill hole 214 into which the electrochromic material is introduced. An additional aperture (not shown) may also be formed to enable a vacuum to be attached and hence to allow vacuum enhanced filling of the chamber between the two substrates. The fill hole 214 is preferably conically shaped with the larger opening disposed at the exterior of the device. The conical hole is formed by drilling partially from each side of the glass lite to avoid the uneven breakthrough and shattering seen when such a hole is drilled from one side only. After the introduction of electrochromic material into the device, the fill hole(s) is plugged (sealed) with some type of material that will not adversely affect the electrochromic material. This material may be a polymeric material such as polyisobutylene, polyolefin, butylnitrile, and the like. Alternatively, this material may be a pliable or rigid sphere or spheroid whose size is selected to fit within the conical hole without dropping into the space formed by the two spaced-apart glass elements. This sphere or spheroid may be made of glass, Teflon® (tetrafluoroethylene fluorocarbon, fluorinated ethylene-propylene, or copolymers thereof), or the like. Preferably, the sphere is a Teflon® ball obtained from Small Parts Inc. The material utilized as the conical hole sealant may also be held in place by an adhesive material. This material may be a pressure sensitive adhesive or a UV curable material, preferably Dyamx- Dymax 20014. A glass or plastic slide may also be superimposed

Applicant : David L. Poll, et al.  
Appln. No. : 10/713,792  
Page : 5

upon the adhesive as an additional sealing material. In the case of a UV curable adhesive, the slide is positioned over the plugged conical hole prior to the curing of the adhesive.

Please replace paragraph [0114] with the following amended paragraph:

[0114] Electrochromic window devices were fabricated from two sheets of glass coated with a transparent conductive layer (~~TEC-15 glass, Libbey Owens Ford~~) (TEC-15 glass, Libbey-Owens-Ford) and measuring approximately 2 inch by 5 inch. These substrates were bonded together by an epoxy perimeter seal containing a small gap for subsequent filling, with the conductive surfaces facing each other in a parallel, spaced-apart manner. The spacing between the electrodes was controlled by the use of spacer beads in the epoxy seal and measured approximately 250 microns. The substrates were offset from each other slightly to allow for electrical contact. The devices were then filled by standard vacuum backfilling techniques through a small fill port left in the perimeter seal with a solution comprising 34 mM methylviologen bis(tetrafluoroborate), 21.8 mM (6-(tetra-t-butylferrocenyl)hexyl)triethylammonium tetrafluoroborate, 2 mM (6-(tetra-t-butylferrocenium)hexyl)triethylammonium bis(tetrafluoroborate), 30 mM 2-(2'-hydroxy-5'-methylphenyl)-benzotriazole (Tinuvin P, Ciba Geigy), and 50 mM 2-(2'-hydroxy-3'-t-butyl-5'-n-pentylpropionate)-benzotriazole in a solution of 3% by weight polymethylmethacrylate (Elvacite<sup>TM</sup> 2051) in propylene carbonate. The fill port was then plugged with a UV curable adhesive and cured by exposure to UV light.

Please replace paragraph [0118] with the following amended paragraph:

[0118] Electrochromic window devices were fabricated in a similar fashion to that described in Example 8 above except that the external dimensions of the windows were 5 inch by 5 inch and the spacing between the front and rear electrodes was maintained at approximately 760 microns. The

Applicant : David L. Poll, et al.  
Appln. No. : 10/713,792  
Page : 6

perimeter seal of these devices was composed of an inner seal and an ambient cure epoxy outer seal. No gap was provided in the seal; rather, the devices were filled via standard vacuum backfilling techniques through a small conical fill port drilled through the face of one of the glass plates. The fill solution comprised 4 mM 5,10-dimethyl-5,10-dihydrophenazine, 6 mM octylviologen bis(tetrafluoroborate), 30 mM 2-(2'-hydroxy-5'-methylphenyl)-benzotriazole (Tinuvin P, Ciba Geigy), and 50 mM 2-(2'-hydroxy-3'-t-butyl-5'-n-pentylpropionate)-benzotriazole in a solution of 8% by weight of a 1:10 isocyanatoethyl methacrylate/methyl methacrylate copolymer in propylene carbonate. The solution also included Bisphenol A as a crosslinking agent in a 1.45 to 1 molar ratio of Bisphenol A to isocyanate functionality on the copolymer. After the fill was complete, a small teflon ball was pressed in the fill port and a thin glass slide measuring approximately 0.5 inch by 0.5 inch was attached as a cover plate over the fill hole using a UV-curable adhesive.